AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listing of claims in the above-referenced application.

Listing of Claims:

1. (Currently Amended) A method for determining a weight of an aircraft comprising:

determining a flight regime corresponding to a current flight state of the aircraft in accordance with one or more inputs characterizing said current flight state of the aircraft~~, said flight regime of the aircraft being associated with a flight state of the aircraft based on said one of more inputs~~;

selecting a neural net in accordance with said flight regime, wherein said neural net is selected from a plurality of neural nets, each of said plurality of neural nets being trained to determine said weight of said aircraft for at least one flight regime based on a relationship between said weight and one or more neural net inputs, and wherein said neural net selected is trained to determine said weight of said aircraft in said flight regime; and

determining said weight using said neural net.

2. (Original) The method of Claim 1, wherein said neural net is trained offline prior to determining said weight of said aircraft.

3. (Original) The method of Claim 2, wherein said determining said weight of said aircraft is performed during operation of said aircraft.

4. (Canceled)

5. (Original) The method of Claim 1, wherein said neural net is a feedforward neural net.

6. (Original) The method of Claim 5, wherein said neural net includes a single hidden layer.

7. (Original) The method of Claim 6, wherein said neural net has a same set of interconnections between each neuron in said hidden layer and an input layer, and a same set of interconnection between said each neuron and an output layer.

8. (Original) The method of Claim 7, wherein each of said neurons in said hidden layer utilizes a same sigmoidal activation function.

9. (Currently Amended) The method of Claim 8, wherein said neural net includes more than [[between]] 20 [[and 35]] neurons in said hidden layer.

10. (Original) The method of Claim 1, wherein said weight is used as an input to another process.

11. (Original) The method of Claim 1, wherein the flight regime is one of a plurality of flight regimes that are mutually exclusive from one another.

12. (Original) The method of Claim 1, wherein the flight regime is manually selected.

13. (Original) The method of Claim 1, wherein the flight regime is an effective flight regime including one or more actual flight regimes using the same set of one or more neural nets.

14. (Original) The method of Claim 1, wherein one or more neural net inputs are used as inputs to said neural net selected, and the one or more neural net inputs include at least one derived parameter that is determined based on mathematical and physical relationships of measured data.

15. (Original) The method of Claim 14, wherein the one or more neural net inputs are a first number of derived parameters determined using a second number of raw data values, the second number being greater than said first number.

16. (Previously Presented) The method of Claim 14, wherein said one or more neural net inputs include at least one of the following:

Corrected Vertical Acceleration (cN_z) represented as:

$$cN_z = 1 + N_z - \left(\frac{1}{\cos[\phi]}\right)$$

Where

N_Z is Vertical Acceleration;

$\emptyset$ is Roll Attitude, wherein $\cos \emptyset$ is not equal to zero;

Torque Coefficient (Cq) represented as:

$$Cq = \frac{Q}{\rho A(\Omega R)^2} = \frac{412.0/100.0 * (Eng1Q + Eng2Q)/2.0}{.0023769 * \sigma * \pi R^2 * (2 * \pi * \frac{Nr}{100} * \frac{257.887}{60} * R)^2}$$

Where Q is total torque (RPM);

ρ is density (lb-sec²/ft⁴);

A is the area of the main rotor disc (ft²);

Ω is the rotation speed of the rotor (rad/s);

R is the radius of the main rotor disc (ft);

Nr is the main rotor speed (%);

σ is the density ratio; and

wherein $\rho A(\Omega R)^2$ is not equal to 0;

Advance Ratio (μ) is represented as:

$$\mu = \frac{V}{\Omega R} = \frac{KIAS * 1.6890}{2 * \pi * \frac{Nr}{100} * \frac{257.887}{60}}$$

Where KIAS is indicated airspeed in knots; and

wherein ΩR is not equal to 0;

Climb rate over tip speed (μ_c) is represented as:

$$\mu_c = \frac{V_c}{\Omega R} = \frac{ROC/60}{2 * \pi * \frac{Nr}{100} * \frac{257.887}{60}}$$

Where ROC is rate of climb (ft/min); and

wherein ΩR is not equal to 0;

Density Ratio (σ) is represented as:

$$\sigma = 0.0023769 * (\frac{288.15}{OAT + 273.15}) * (1 - (0.0019812 * \frac{Hp}{288.15}))^{5.256}$$

Where OAT is outside air temperature (°C);

Hp is Barometric Altitude (ft).

17. (Original) The method of Claim 16, wherein said neural net inputs include roll attitude and pitch attitude in accordance with the selected flight regime.

18. (Original) The method of Claim 16, wherein one of said neural net inputs is a derived parameter based on at least one of roll attitude and pitch attitude in accordance with the selected flight regime.

19. (Original) The method of Claim 1, wherein the neural net is included in a gross weight processor.

20. (Original) The method of Claim 1, wherein the gross weight processor is included on the aircraft for which said weight is determined.

21. (Original) The method of Claim 1, wherein the gross weight processor is included at a ground location and communicates with said aircraft.

22. (Original) The method of Claim 1, wherein the one or more inputs include at least one of: a sensor measurement, manual input, data from a storage location.

23. (Original) The method of Claim 1, further comprising:

determining said flight regime as a hover flight regime in accordance with the following input parameters: landing flag, takeoff flag, weight on wheels, yaw rate, rate of climb, pitch attitude, roll attitude, drift velocity, ground speed, airspeed, and control reversal flag, wherein said landing flag indicates whether said aircraft is landing, said takeoff flag indicates whether said aircraft is in takeoff mode, and said control reversal flag indicates whether said aircraft is in a reversal mode.

24. (Original) The method of Claim 23, wherein said landing flag indicates no landing, said takeoff flag indicates no takeoff, said weight on wheels indicates no weight on wheels, said control reversal flag indicates that said aircraft is not in reversal mode, said yaw rate has an approximate value within the inclusive range of: $-2.5 \leq$ yaw rate 2.5 degrees/second, said pitch attitude is approximately 10 degrees, said rate of climb is approximately within the inclusive range of: $-200 \leq$ rate of climb ≤ 200 feet/minute, said roll attitude approximates a value within the inclusive range of: $-6 \leq$ roll attitude ≤ 3 degrees, said drift velocity approximates a value within the inclusive range of: $-7 \leq$ drift velocity ≤ 7 knots said ground speed approximates a value within the inclusive range of: $-7 \leq$ ground speed ≤ 7 knots, said airspeed is an approximate value less than or equal to 38 knots.

25. (Original) The method of Claim 24, further comprising:

determining that said aircraft is in a hover flight regime at a first point in time; and

determining that said aircraft remains in said hover flight regime at a second later point in time if said airspeed at said second later point in time does not exceed 43 knots.

26. (Original) The method of Claim 1, further comprising:

determining said flight regime as a forward flight regime in accordance with the following input parameters: landing flag, takeoff flag, weight on wheels, yaw rate, rate of climb, pitch attitude, roll attitude, airspeed, control reversal flag, and sideslip, wherein said landing flag indicates whether said aircraft is landing, said takeoff flag indicates whether said aircraft is in takeoff mode, and said control reversal flag indicates whether said aircraft is in a reversal mode.

27. (Original) The method of Claim 26, wherein said landing flag indicates no landing, said takeoff flag indicates no takeoff, said weight on wheels indicates no weight on wheels, said control reversal flag indicates that said aircraft is not in reversal mode, said yaw rate has an approximate value within the inclusive range of: $-5 \leq$ yaw rate ≤ 5 degrees/second, said pitch attitude is within the inclusive range of: $-10 \leq$ pitch attitude ≤ 10 degrees, said rate of climb is approximately within the inclusive range of: $-500 \leq$ rate of climb ≤ 500 feet/minute, said roll attitude approximates a value within the inclusive range of: $-10 \leq$ roll attitude ≤ 10 degrees, said side slip approximates a value within the inclusive range of: $-0.05 \leq$ side slip ≤ 0, said airspeed is an approximate value greater than 38 knots.

28. (Original) The method of Claim 27, further comprising:

determining that said aircraft is in a forward flight regime at a first point in time; and

determining that said aircraft remains in said forward flight regime at a second later point in time if said airspeed at said second later point in time is greater than 33 knots.

29. (Original) The method of Claim 1, further comprising:

determining said flight regime as a turn flight regime in accordance with the following input parameters: landing flag, takeoff flag, weight on wheels, roll attitude, airspeed, and rate of climb, wherein said landing flag indicates whether said aircraft is landing and said takeoff flag indicates whether said aircraft is in takeoff mode.

30. (Original) The method of Claim 29, wherein said landing flag indicates no landing, said takeoff flag indicates no takeoff, said weight on wheels indicates no weight on wheels, said rate of climb is approximately within the inclusive range of: $-500 \leq$ rate of climb ≤ 500 feet/minute, said roll attitude approximates a value within the inclusive range of: $-10 \leq$ roll attitude ≤ 10 degrees, said airspeed is an approximate value greater than 38 knots.

31. (Original) The method of Claim 30, further comprising:

determining that said aircraft is in a turn flight regime at a first point in time; and

determining that said aircraft remains in said turn flight regime at a second later point in time unless at least one of the following is true: roll attitude is outside of the range -7,+13, and said airspeed is less than 36.

32. (Original) The method of Claim 1, wherein said one or more inputs are scaled within a predetermined range.

33. (Original) The method of Claim 1, further comprising:

determining a sensitivity of said weight with respect to a parameter used in determining said weight.

34. (Original) The method of Claim 33, wherein said sensitivity of said weight with respect to said parameter is determined in accordance with a partial derivative of said weight with respect to said parameter.

35. (Currently Amended) The method of Claim 34, wherein said weight is determined using a neural network and represented as:

$$\hat{W}_g(z) = \gamma\left[b2 + \sum_{i=1}^{P} W2_i * \gamma\left(b1_i + \sum_{j=1}^{m} W1_{i,j} * z_j\right)\right]$$

where z is a vector of inputs, p is a number of neurons in the hidden layer, m is a number of inputs, $W1_{i,j}$ is a weight of the j^{th} input to the i^{th} neuron in the hidden layer, $b1_i$ is a bias added to the i^{th} neuron, $W2_i$ is a weight of the i^{th} neuron to the output neuron, b2 is a bias added to an output neuron, and γ is the tanh function, and wherein tanh is not equal to zero.

36. (Previously Presented) The method of Claim 35, wherein, said neural network is a feedforward neural net with one hidden layer containing p sigmoidal neurons, and the sensitivity is represented as:

$\delta\hat{W}_g(z)/\delta z_k =$

$$\gamma'\left[b2+\sum_{i=1}^{P}W2_i*\gamma\left(b1_i+\sum_{j=1}^{m}W1_{i,j}*z_j\right)\right]*\sum_{i=1}^{P}W2_i*W1_{i,k}*\gamma'\left(b1_i+\sum_{j=1}^{m}W1_{i,j}*z_j\right)$$

where γ' is $\cosh^{-2}$, wherein tanh and $\cosh^{-2}$ are not equal to zero.

37. (Original) The method of Claim 36, wherein said sensitivity with respect to an input vector z having said parameter that is a kth parameter, z_k , is determined as a partial derivative of said weight with respect to the kth parameter evaluated in accordance with the input vector.

38. (Currently Amended) A method of determining a weight of an aircraft comprising:

receiving one or more values related to the aircraft and used in determining the weight of the aircraft; and

determining said weight at a point in time using a Kalman filter wherein said one or more values are used as inputs to said Kalman filter and said Kalman filter produces the weight as an output, a state as determined by said Kalman filter corresponding to state parameters including a weight of the aircraft at said point in time and fuel flow rate at said point in time, a measurement vector for said Kalman filter including a weight of the aircraft, a fuel flow rate, and a second weight of the aircraft determined in accordance with a flight regime of the aircraft characterizing a flight state of the aircraft, a covariance matrix used by said Kalman filter including an element associated with said second weight wherein a value of said element varies in accordance with whether said aircraft is determined to be in said flight regime when said determining step is performed.

39. (Currently Amended) The method of Claim 38, wherein one or more measurements are input to said Kalman filter, and the method further comprising:

~~determining a flight regime in accordance with one or more regime measurements, said flight regime of the aircraft being associated with a flight state of the aircraft based on said one of more regime measurements;~~

selecting a function based on said flight regime; and

determining, using said function, said value of said element of said [[a]] covariance matrix associated with said second weight, said function using said one or more measurements to

determine whether said aircraft is currently in said flight regime and to accordingly determine said value ~~one of said measurements in accordance with said function~~.

40. (Currently Amended) The method of Claim 39, wherein said flight regime is the hover flight regime~~, and said function determines said covariance associated with a weight estimate~~.

41. (Currently Amended) The method of Claim 40, wherein said function determines said value of said element of said covariance matrix in accordance with body accelerations of said aircraft along x and z axes, roll attitude, pitch attitude, airspeed and altitude.

42. (Canceled)

43. (Currently Amended) The method of Claim [[42]] 38, wherein said second weight of the aircraft is an estimate that is a predetermined value based on vehicle flight and performance data.

44. (Currently Amended) The method of Claim [[42]] 38, wherein said second weight of the aircraft is an estimate [[is]] based on manually entered data representing a sum gross weight of said aircraft.

45. (Original) The method of Claim 39, wherein said flight regime is manually determined.

46. (Original) The method of Claim 39, wherein said flight regime is determined in accordance with a predetermined mapping that maps one or more values to a particular flight regime, wherein a given set of one or more inputs values uniquely maps to a flight regime.

47. (Currently Amended) The method of Claim 38, wherein said Kalman filter produces the weight as an output used as an input to another component.

48. (Currently Amended) A system for determining a weight of an aircraft comprising:

a regime recognizer that determines a regime indicator in accordance with a portion of said one or more inputs, said regime indicator indicating a flight regime associated with a current flight state of the aircraft based on said portion of the one or more inputs; and

a gross weight estimator that determines said weight of said aircraft, said gross weight estimator including at least one of: a Kalman filter, and one or more neural nets, and using at least one of said Kalman filter and a first of said one or more neural nets in determining said weight, each of said one or more neural nets being trained to determine said weight of the aircraft for at least one flight regime based on a relationship between said weight and one or more neural net inputs, a state as determined by said Kalman filter at a point in time corresponding to state parameters including the weight of the aircraft and fuel flow rate at said point in time.

49. (Currently Amended) The system of Claim 48, wherein said system further comprises:

an input processor that processes one or more inputs producing one or more processed inputs, said one or more inputs including at least one sensor measurement; and

a portion of said one or more processed inputs are neural net inputs used by said one or more neural nets, and said gross weight estimator including:

a neural net selector that selects a neural net in accordance with said regime indicator, said neural net selected being trained to determine said weight of said aircraft in said flight regime.

50. (Original) The system of Claim 49, wherein said regime recognizer is included in said input processor.

51. (Original) The system of Claim 48, wherein said gross weight estimator includes one or more neural nets whose output, when said one or more neural nets is selected in accordance with said flight regime indicator, is an input to said Kalman filter.

52. (Currently Amended) A method for determining an aircraft parameter comprising:

determining a flight regime corresponding to a current flight state of an aircraft in accordance with one or more inputs characterizing said current flight state of the aircraft~~, said flight regime of the aircraft being associated with a flight state of the aircraft based on said one of more inputs~~;

selecting a neural net in accordance with said flight regime, wherein said neural net is selected from a plurality of neural nets, each of said plurality of neural nets being trained to determine said aircraft parameter when the aircraft is in at least one flight regime based on a relationship between said aircraft parameter and one or more neural net inputs, and wherein said neural net selected is trained to determine said aircraft parameter when the aircraft is in said flight regime; and

determining said aircraft parameter using said neural net.

53. (Original) The method of Claim 52, wherein said neural net uses at least one derived parameter determined from a relationship between one or more raw input values.

54-55. (Canceled)

56. (Currently Amended) A system for determining an aircraft parameter comprising:

a regime recognizer that determines a regime indicator in accordance with a portion of said one or more inputs, said regime indicator representing a flight regime of an aircraft being associated with a current flight state of the aircraft based on said portion of the one of more inputs; and

an aircraft parameter generator that determines said aircraft parameter, said aircraft parameter generator including at least one of: a Kalman filter, and one or more neural nets, and using at least one of said Kalman filter and a first of said one or more neural nets in determining said aircraft parameter, each of said one or more neural nets being trained to determine said aircraft parameter when said aircraft is in at least one flight regime based on a relationship between said aircraft parameter and one or more neural net inputs, a state as determined by said Kalman filter including said aircraft parameter at a point in time.

57. (Currently Amended) A computer readable medium comprising code stored thereon for determining a weight of an aircraft, the computer readable medium comprising code that:

determines a flight regime corresponding to a current flight state of the aircraft in accordance with one or more inputs characterizing said current flight state of the aircraft~~, said flight regime of the aircraft being associated with a flight state of the aircraft based on said one of more inputs~~;

selects a neural net in accordance with said flight regime, wherein said neural net is selected from a plurality of neural nets, each of said plurality of neural nets being trained to determine said weight of said aircraft for at least one flight regime based on a relationship between said weight and one or more neural net inputs, and wherein said neural net selected is trained to determine said weight of said aircraft in said flight regime; and

determines said weight using said neural net.

58. (Previously Presented) The computer readable medium of Claim 57, wherein said neural net is trained offline prior to determining said weight of said aircraft.

59. (Previously Presented) The computer readable medium of Claim 58, wherein said code that determines said weight of said aircraft is executed during operation of said aircraft.

60. (Canceled)

61. (Previously Presented) The computer readable medium of Claim 57, wherein said neural net is a feedforward neural net.

62. (Previously Presented) The readable medium of Claim 61, wherein said neural net includes a single hidden layer.

63. (Previously Presented) The computer readable medium of Claim 62, wherein said neural net has a same set of interconnections between each neuron in said hidden layer and an input layer, and a same set of interconnection between said each neuron and an output layer.

64. (Previously Presented) The computer readable medium of Claim 63, wherein each of said neurons in said hidden layer utilizes a same sigmoidal activation function.

65. (Currently Amended) The computer readable medium of Claim 64, wherein said neural net includes [[between]] <u>more than</u> 20 [[and 35]] neurons in said hidden layer.

66. (Previously Presented) The computer readable medium of Claim 57, wherein said weight is used as an input to another process.

67. (Previously Presented) The computer readable medium of Claim 57, wherein the flight regime is one of a plurality of flight regimes that are mutually exclusive from one another.

68. (Previously Presented) The computer readable medium of Claim 57, wherein the flight regime is manually selected.

69. (Previously Presented) The computer readable medium of Claim 57, wherein the flight regime is an effective flight regime including one or more actual flight regimes using the same set of one or more neural nets.

70. (Previously Presented) The computer readable medium of Claim 57, wherein one or more neural net inputs are used as inputs to said neural net selected, and the one or more neural net inputs include at least one derived parameter that is determined based on mathematical and physical relationships of measured data.

71. (Previously Presented) The computer readable medium of Claim 70, wherein the one or more neural net inputs are a first number of derived parameters determined using a second number of raw data values, the second number being greater than said first number.

72. (Previously Presented) The computer readable medium of Claim 70, wherein said one or more neural net inputs include at least one of the following:

Corrected Vertical Acceleration (cN_z) represented as:

$$cN_z = 1 + N_z - \left(\frac{1}{\cos[\phi]}\right)$$

Where

N_Z is Vertical Acceleration;

$\emptyset$ is Roll Attitude, wherein cos $\emptyset$ is not equal to zero;

Torque Coefficient (Cq) represented as:

$$Cq = \frac{Q}{\rho A(\Omega R)^2} = \frac{412.0/100.0*(Eng1Q+Eng2Q)/2.0}{.0023769*\sigma*\pi R^2*(2*\pi*\frac{Nr}{100}*\frac{257.887}{60}*R)^2}$$

Where Q is total torque (RPM);
ρ is density (lb-sec^2/ft^4);
A is the area of the main rotor disc (ft^2);
Ω is the rotation speed of the rotor (rad/s);
R is the radius of the main rotor disc (ft);
Nr is the main rotor speed (%);
σ is the density ratio; and
wherein ρ A(ΩR)^2 is not equal to 0;

Advance Ratio (μ) is represented as:

$$\mu = \frac{V}{\Omega R} = \frac{KIAS*1.6890}{2*\pi*\frac{Nr}{100}*\frac{257.887}{60}}$$

Where KIAS is indicated airspeed in knots; and
wherein ΩR is not equal to 0;

Climb rate over tip speed (μ_c) is represented as:

$$\mu_c = \frac{V_c}{\Omega R} = \frac{ROC/60}{2*\pi*\frac{Nr}{100}*\frac{257.887}{60}}$$

Where ROC is rate of climb (ft/min);
and wherein ΩR is not equal to 0;

Density Ratio (σ) is represented as:

$$\sigma = 0.0023769*(\frac{288.15}{OAT+273.15})*(1-(0.0019812*\frac{Hp}{288.15}))^{5.256}$$

Where OAT is outside air temperature (°C);
Hp is Barometric Altitude (ft).

73. (Previously Presented) The computer readable medium of Claim 72, wherein said neural net inputs include roll attitude and pitch attitude in accordance with the selected flight regime.

74. (Previously Presented) The computer readable medium of Claim 72, wherein one of said neural net inputs is a derived parameter based on at least one of roll attitude and pitch attitude in accordance with the selected flight regime.

75. (Previously Presented) The computer readable medium of Claim 57, wherein the neural net is included in a gross weight processor.

76. (Previously Presented) The computer readable medium of Claim 57, wherein the gross weight processor is included on the aircraft for which said weight is determined.

77. (Previously Presented) The computer readable medium of Claim 57, wherein the gross weight processor is included at a ground location and communicates with said aircraft.

78. (Previously Presented) The computer readable medium of Claim 57, wherein the one or more inputs include at least one of: a sensor measurement, manual input, data from a storage location.

79. (Previously Presented) The computer readable medium of Claim 57, further comprising code that:

determines said flight regime as a hover flight regime in accordance with the following input parameters: landing flag, takeoff flag, weight on wheels, yaw rate, rate of climb, pitch

attitude, roll attitude, drift velocity, ground speed, airspeed, and control reversal flag, wherein said landing flag indicates whether said aircraft is landing, said takeoff flag indicates whether said aircraft is in takeoff mode, and said control reversal flag indicates whether said aircraft is in a reversal mode.

80. (Previously Presented) The computer readable medium of Claim 79, wherein said landing flag indicates no landing, said takeoff flag indicates no takeoff, said weight on wheels indicates no weight on wheels, said control reversal flag indicates that said aircraft is not in reversal mode, said yaw rate has an approximate value within the inclusive range of: $-2.5 \leq$ yaw rate 2.5 degrees/second, said pitch attitude is approximately 10 degrees, said rate of climb is approximately within the inclusive range of: $-200 \leq$ rate of climb ≤ 200 feet/minute, said roll attitude approximates a value within the inclusive range of: $-6 \leq$ roll attitude ≤ 3 degrees, said drift velocity approximates a value within the inclusive range of: $-7 \leq$ drift velocity ≤ 7 knots said ground speed approximates a value within the inclusive range of: $-7 \leq$ ground speed ≤ 7 knots, said airspeed is an approximate value less than or equal to 38 knots.

81. (Previously Presented) The computer readable medium of Claim 80, further comprising code that:

determines said aircraft is in a hover flight regime at a first point in time; and

determines said aircraft remains in said hover flight regime at a second later point in time if said airspeed at said second later point in time does not exceed 43 knots.

82. (Previously Presented) The computer readable medium of Claim 57, further comprising:

code that determines said flight regime as a forward flight regime in accordance with the following input parameters: landing flag, takeoff flag, weight on wheels, yaw rate, rate of climb, pitch attitude, roll attitude, airspeed, control reversal flag, and sideslip, wherein said landing flag indicates whether said aircraft is landing, said takeoff flag indicates whether said aircraft is in takeoff mode, and said control reversal flag indicates whether said aircraft is in a reversal mode.

83. (Previously Presented) The computer readable medium of Claim 82, wherein said landing flag indicates no landing, said takeoff flag indicates no takeoff, said weight on wheels indicates no weight on wheels, said control reversal flag indicates that said aircraft is not in reversal mode, said yaw rate has an approximate value within the inclusive range of: $-5 \leq$ yaw rate ≤ 5 degrees/second, said pitch attitude is within the inclusive range of: $-10 \leq$ pitch attitude $\leq$ 10 degrees, said rate of climb is approximately within the inclusive range of: $-500 \leq$ rate of climb ≤ 500 feet/minute, said roll attitude approximates a value within the inclusive range of: $-10 \leq$ roll attitude ≤ 10 degrees, said side slip approximates a value within the inclusive range of: $-0.05 \leq$ side slip ≤ 0, said airspeed is an approximate value greater than 38 knots.

84. (Previously Presented) The computer readable medium of Claim 83, further comprising code that:

determines said aircraft is in a forward flight regime at a first point in time; and

determines said aircraft remains in said forward flight regime at a second later point in time if said airspeed at said second later point in time is greater than 33 knots.

85. (Previously Presented) The computer readable medium of Claim 57, further comprising code that:

determines said flight regime as a turn flight regime in accordance with the following input parameters: landing flag, takeoff flag, weight on wheels, roll attitude, airspeed, and rate of climb, wherein said landing flag indicates whether said aircraft is landing and said takeoff flag indicates whether said aircraft is in takeoff mode.

86. (Previously Presented) The computer readable medium of Claim 85, wherein said landing flag indicates no landing, said takeoff flag indicates no takeoff, said weight on wheels indicates no weight on wheels, said rate of climb is approximately within the inclusive range of: $-500 \leq$ rate of climb ≤ 500 feet/minute, said roll attitude approximates a value within the inclusive range of: $-10 \leq$ roll attitude ≤ 10 degrees, said airspeed is an approximate value greater than 38 knots.

87. (Previously Presented) The computer readable medium of Claim 86, further comprising code that:

determines said aircraft is in a turn flight regime at a first point in time; and

determines said aircraft remains in said turn flight regime at a second later point in time unless at least one of the following is true: roll attitude is outside of the range -7,+13, and said airspeed is less than 36.

88. (Previously Presented) The computer readable medium of Claim 57, wherein said one or more inputs are scaled within a predetermined range.

89. (Previously Presented) The computer readable medium of Claim 57, further comprising code that:

determines a sensitivity of said weight with respect to a parameter used in determining said weight.

90. (Previously Presented) The computer readable medium of Claim 89, wherein said sensitivity of said weight with respect to said parameter is determined in accordance with a partial derivative of said weight with respect to said parameter.

91. (Currently Amended) The computer readable medium of Claim 90, wherein said weight is determined using a neural network and represented as:

$$\hat{W}_g(z) = \gamma\left[b2 + \sum_{i=1}^{P} W2_i * \gamma\left(b1_i + \sum_{j=1}^{m} W1_{i,j} * z_j\right)\right]$$

where z is a vector of inputs, p is a number of neurons in the hidden layer, m is a number of inputs, $W1_{i,j}$ is a weight of the j^{th} input to the i^{th} neuron in the hidden layer, $b1_i$ is a bias added to the i^{th} neuron, $W2_i$ is a weight of the i^{th} neuron to the output neuron, b2 is a bias added to an output neuron, and γ is the tanh function and wherein tanh is not equal to zero.

92. (Previously Presented) The computer readable medium of Claim 91, wherein, said neural network is a feedforward neural net with one hidden layer containing p sigmoidal neurons, and the sensitivity is represented as:

$$\delta \hat{W}_g(z)/\delta z_k = \gamma'\left[b2 + \sum_{i=1}^{P} W2_i * \gamma\left(b1_i + \sum_{j=1}^{m} W1_{i,j} * z_j\right)\right] * \sum_{i=1}^{P} W2_i * W1_{i,k} * \gamma'\left(b1_i + \sum_{j=1}^{m} W1_{i,j} * z_j\right)$$

where γ' is $\cosh^{-2}$, wherein tanh and $\cosh^{-2}$ are not equal to zero.

93. (Previously Presented) The computer readable medium of Claim 92, wherein said sensitivity with respect to an input vector z having said parameter that is a kth parameter, z_k, is determined as a partial derivative of said weight with respect to the kth parameter evaluated in accordance with the input vector.

94. (Currently Amended) A computer readable medium comprising code stored thereon that determines a weight of an aircraft, the computer readable medium comprising code that:

receives one or more values related to the aircraft and used in determining the weight of the aircraft; and

determines said weight at a point in time using a Kalman filter wherein said one or more values are used as inputs to said Kalman filter and said Kalman filter produces the weight as an

output, a state as determined by said Kalman filter corresponding to state parameters including a weight of the aircraft at said point in time and fuel flow rate at said point in time, a measurement vector for said Kalman filter including a weight of the aircraft, a fuel flow rate, and a second weight of the aircraft determined in accordance with a flight regime of the aircraft characterizing a flight state of the aircraft, a covariance matrix used by said Kalman filter including an element associated with said second weight wherein a value of said element varies in accordance with whether said aircraft is determined to be in said flight regime when said determines is performed.

95. (Currently Amended) The computer readable medium of Claim 94, wherein one or more measurements are input to said Kalman filter, and the computer program product further comprising code that:

~~determines a flight regime in accordance with one or more regime measurements, said flight regime of the aircraft being associated with a flight state of the aircraft based on said one of more regime measurements;~~

selects a function based on said flight regime; and

determines, using said function, said value of said element of said [[a]] covariance matrix associated with said second weight, said function using one or more measurements to determine whether said aircraft is currently in said flight regime and accordingly determine said value ~~one of said measurements in accordance with said function~~.

96. (Currently Amended) The computer readable medium of Claim 95, wherein said flight regime is the hover flight regime~~, and said function determines said covariance associated with a weight estimate~~.

97. (Currently Amended) The computer readable medium of Claim 96, wherein said function determines said value of said element of said covariance matrix in accordance with body accelerations of said aircraft along x and z axes, roll attitude, pitch attitude, airspeed and altitude.

98. (Canceled)

99. (Currently Amended) The computer readable medium of Claim [[98]] 94, wherein said second weight of the aircraft is an estimate that is a predetermined value based on vehicle flight and performance data.

100. (Currently Amended) The computer readable medium of Claim [[98]] 94, wherein said second weight of the aircraft is an estimate [[is]] based on manually entered data representing a sum gross weight of said aircraft.

101. (Previously Presented) The computer readable medium of Claim 95, wherein said flight regime is manually determined.

102. (Previously Presented) The computer readable medium of Claim 95, wherein said flight regime is determined in accordance with a predetermined mapping that maps one or more values to a particular flight regime, wherein a given set of one or more inputs values uniquely maps to a flight regime.

103. (Currently Amended) The computer readable medium of Claim 94, wherein said Kalman filter produces the weight as an output used as an input to another component.

104. (Currently Amended) A computer readable medium comprising code stored thereon for determining an aircraft parameter, the computer readable medium comprising code that:

determines a flight regime corresponding to a current flight state of an aircraft in accordance with one or more inputs characterizing said current flight state of the aircraft~~, said flight regime of an aircraft being associated with a flight state of the aircraft based on said one of more inputs~~;

selects a neural net in accordance with said flight regime, wherein said neural net is selected from a plurality of neural nets, each of said plurality of neural nets being trained to determine said aircraft parameter when the aircraft is in at least one flight regime based on a relationship between said aircraft parameter and one or more neural net inputs, and wherein said neural net selected is trained to determine said aircraft parameter when the aircraft is in said flight regime; and

determines said aircraft parameter using said neural net.

105. (Previously Presented) The computer readable medium of Claim 104, wherein said neural net uses at least one derived parameter determined from a relationship between one or more raw input values.

106-107 (Canceled)

108. (New) A method of determining a weight of an aircraft comprising:

receiving one or more measurements characterizing a current flight state of the aircraft;

determining a flight regime indicating the current flight state of the aircraft using at least a portion of said one or more measurements;

selecting, in accordance with said flight regime, a neural net from a plurality of neural nets, each of said plurality of neural nets being trained to determine said weight of said aircraft for at least one flight regime based on a relationship between said weight and one or more neural net inputs, wherein said neural net selected is trained to determine said weight of said aircraft in said flight regime;

determining said weight using said neural net; and

using a Kalman filter to determine an updated weight of the aircraft, a state as determined by said Kalman filter corresponding to state parameters at a point in time including a weight of the aircraft and an engine fuel flow rate at said point in time, a measurement vector for said Kalman filter including said weight from said neural net.

109. (New) The method of Claim 108, wherein said aircraft is a rotorcraft.

110. (New) The method of Claim 108, wherein said Kalman filter uses a covariance matrix with an entry corresponding to said weight from said neural net, and wherein the method further comprising:

determining a value for said entry using at least a second portion of said one or more measurements indicating a current flight state of the aircraft.

111. (New) The method of Claim 40, wherein said aircraft is a rotorcraft and said hover flight regime corresponds to said rotorcraft hovering.

112. (New) The computer readable medium of Claim 96, wherein said aircraft is a rotorcraft and said hover flight regime corresponds to said rotorcraft hovering.